AN ENGINEERS GUIDE TO THE CIVIL AVIATION REGULATIONS

By

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Foreword by

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FOREWORD

By Peter G. Masefield, M.A. (Engineering) Cantab., F.R.Ae.S., A.F.Inst.Ae.S. (Hon).M.S.L.A.E., Chief Executive of British European Airways Corporation.

Successful air transport operations, whether they be scheduled or charter, can be founded only on a solid basis of safety, reliability and economy of operation.

Those three fundamental requirements have, as their core, a satisfactory engineering establishment. Safety depends essentially on efficient maintenance and inspection. Reliability of operation can be achieved only if the engineering staff performs its tasks efficiently and to a timetable. The whole economy of an airline is bound up with the way in which it tackles its engineering problems. Their importance is manifest in that, all-in, engineering costs add up to somewhere around 20 per cent of total airline expenditure.

For these reasons I am very pleased to have en asked to write this brief foreword to Mr. Maniez' "An Engineer's Guide to the Civil Aviation Regulations" published by the Society of Licensed Aircraft Engineers. The practical engineer will find here a concise record of the multifarious regulations with which he has to deal, together with valuable notes on their purpose (not always obvious), their requirements, (often elusive), and how to cope with them (frequently misunderstood). Such a compendium has long been needed. It forms a most convenient reference.

Mr. Maniez has been at pains to ensure thoroughness in his compilation. As an instance of this I have been edified to learn that "For Flights Involving Manoeuvres on the Water" I must take with me:-

1. A Fog Horn.
2. A Bell or Gong.
3. Equipment for displaying Lights.

All of which suggest that in this particu instance the Ministry of Civil Aviation legislate thoughtfully for a "learoplane" rather than an aeroplane, inhabited by Mr. Lear's Jumblies, Pobble and Dong, who:-

"When the sun went down
"Whistled and warbled a moony song"
"To the echoing sound of a coppery gong", and

"When boats or ships came near
"Twinkledy-binkledy-winkled a bell"
"So that all the World could hear", while

"Through the vast and gloomy dark
There moves what seems a fiery spark"
"Slowly it wanders - pauses, creeps-"
"Anon it sparkles - flashes and leaps"
"So the wandering Dong through the forest goes
The Dong - The Dong with a luminous nose".

Doubtless in the form of "two red lights, one vertically over the other not less than three feet apart and visible for three nautical miles".

Be that as it may - and there is much that is whimsical in the Civil Air Regulations - Mr. Maniez has performed a valuable service in compiling his "Engineer's Guide" - and the Society of Licensed Aircraft Engineers are to be congratulated on its publication.

Peter Masefield

AN ENGINEER'S GUIDE TO THE CIVIL AVIATION REGULATIONS.

PREFACE

Applicants for Aircraft Engineer's Licences are required to answer questions on the Air Navigation Regulations, as far as they affect the Licence, in the category for which applica n is made. Licensed Engineers are also required to keep their knowledge of this subject up-to-date and are moreoever compelled to state that they have done so before their Licences can be renewed. Even to read through all the Regulations takes some time, and to understand the legal phraseology and sort out that which may affect the engineer, is a task for which most engineers have neither the inclination nor the time. To make matters worse, much of the knowledge they are expected to possess cannot be obtained from any one publication alone. Some may be in the form of instructions from the A.R.B., or alternatively be accepted practice and as such may not appear in any official publications.

In the following pages I have tried to present, in a understandable form, (for instance. I have translated "gyroscopic bank and pitch indicator" as Artificial horizon), all the information upon the Regulations which the engineer will require, while omitting pages and pages of legalities which are not his immediate concern. I have included no reference to airships, balloons, kites, gyroplanes, flying saucers or gliders, as the law, so far as it affects the engineer, is similar to that governing the normal type of aeroplane upon which the majority of people reading this will hold, or hope to hold, licences. I would mention that the Ministry of Civil Aviation are not, at present, enforcing Certificate of Airworthiness procedure upon owners of gliders, provided certain requirements are satisfied, nor is the Air Registration Board accepting applications for Maintenance Engineers Licences in respect of these aircraft. Anyone interested in this branch of engineering should communicate with the British Gliding Association, 19, Park Lane, London, W.1.

Although this little book is chiefly written for present and future Licensed Aircraft Engineers, by a current Licence Holder, it is hoped that it may be of assistance to these members of A.R.B. "approved firms", who are also required to be conversant with the Regulations.

Finally, my grateful appreciation is extended to M.T.Holdham Esq. A.R.Ae.S., M.S.L.A.E., CHAIRMAN of the Technical and Publications Panel of the Society of Licensed Aircraft Engineers and all others whose invaluable advice and guidance has been made so readily available to me.

V.L.A. Maniez. A.R.Ae.S. A.M.S.L.A.E.

APRIL.1950.

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CHAPTER I

i. THE OFFICIAL PUBLICATIONS

		Short Title
The Air Navigation Order 1949.	Price two shillings.	A.N.O.
The Air Navigation (Amendment) Order 1950.	Price fourpence.	A.N.(A)O
The Air Navigation (General) Regulations 1949.	Price one shilling & eightpence.	A.N.(G)R
The Air Navigation (General) (Amendment) Regulations 1950.	Price fourpence.	A.N.(G)(A)R
The Air Navigation (Radio) Regulations 949.	Price fivepence.	A.N.(R)R
The Air Navigation (Radio) (Amendment) Regulations 1950.	Price twopence.	A.N.(R)(A)R
The British Civil Airworthiness Requirements.	Price two pounds two shillings.	B.C.A.R. or Requirements.

		Short Title
Civil Aircraft Inspection Procedures.	Price one pound, nine shillings & sixpence.	
Air Registration Board Notices to Licensed Aircraft Engineers, and owners of Civil Aircraft.		A.R.B. Notices.

These are the regulations and should be in the possession of every Licensed Engineer. The first three, known as Statutory Instruments, are published by H.M. Stationery Office, and may be ordered through any bookseller. Announcement of the publication of amendments is usually made in such periodicals as "The Aeroplane" and "Flight", but it is better to subscribe to a deposit scheme with the publishers to get the amendments automatically.

The British Civil Airworthiness Requirements, or "The Requirements" for short, are obtainable from the Publications Department, Air Registration Board, Greville House, 37 Gratton Road, Cheltenham, Glos. The price is two guinea but holders of a current licence in any category get them at half price. Amendments to this publication are also announced in the technical press. Those with no licences should try to borrow a copy of the Requirements.

"Civil Aircraft Inspection Procedures" are leaflets, published by the Air Registration Board, on recommended practices relating to aircraft construction, repair and maintenance. They are intended to replace Air Publication 1208 Volume II, which was the inspection part of the Air Ministry's "Airworthiness Handbook for Civil Aircraft", now obsolete.

The Air Registration Board Notices supersede and cancel the old "Notices to Owners of Civil Aircraft and Ground Engineers". They are issued to all persons with current aircraft engineer's licences free of charge. It will usually be found that Licensed Engineers are quite pleased to help others, who are genuinely trying to qualify. If the books are borrowed from some good natured fellow, be sure to return them. They are the tools of his trade. If, for instance, he has to change a propeller in a hurry and the only spare has a different part number to the original, he will want to know if it is approved for use with the installation concerned. There is an Air Registration Board Notice which will tell him this. That is why documents are so essential to the man who has to stake his career on a correct decision every time he signs his name with his licence number after it.

The Air Registration Board Handbook No.1 gives a summary of much of the relevant regulations contained in the Government Publications and other useful information in simple form. The price is two shillings and sixpence from the Air Registration Board.

The Air Navigation Order (1949), is an order made under the Air Navigation Act 1947, and is therefore a Law of the Realm (applicable to all

British Registered Aircraft at all times and, unless the contrary intention appears, to Foreign and Dominion aircraft, when in or over Great Britain and Northern Ireland).

The Air Navigation (General) and (Radio) Regulations supplement the Air Navigation Order. The following is a summary of the legislation which affect the Licensed Aircraft Engineer, and on which questions may be based in the examination. References in brackets are to corresponding sections of official publications.

ii. THE AIR REGISTRATION BOARD: (A.R.B.)

The Air Registration Board is a body to which certain functions have been delegated by the Minister of Civil Aviation.

The Head Office is at Brettenham House, Lancaster Place, Strand, LONDON. W.C.2. whilst local offices under a Surveyor-in-Charge are situated at various aerodromes throughout the country - Croydon, Heston, Hatfield, etc. a full list being given in the Air Registration Board Notices. Approved firms and Licensed Engineers come under the supervision of the Surveyor in whose area they operate.

"Approved" means approved by the Minister of Civil Aviation or by the Air Registration Board. (AN. (G). R. Section 1 (2).)

iii. LICENCES.

The Minister of Civil Aviation may grant licences to persons to act in the capacity of Aircraft Maintenance Engineers to issue, in connection with the construction, repair and maintenance of aircraft, certificates required by the Air Navigation Order.

(A.N.O. Section VIII)

Application for the grant or extension of an aircraft Maintenance Engineer's Licence must be made to the Air Registration Board, and may be for any one of five categories - A.B.C.D.X. Licences are valid for the duties and types of aircraft, engines etc. shown thereon, and may be used as authority to certify aircraft registered in the United Kingdom or in another country upon the written authority of the country concerned. Licence Holders must be over 21 years of age, and must sign their licences.

The Experience required of applicants, and the syllabus of examination for the various categories and scope of Licence, are given in section 'L' of the Civil Airworthiness Requirements (which may be obtained separately price one shilling).

The duties which may be performed by holders of Licences in various categorties are given below. It is important to be sure of all the duties of the category of licence applied for, as this will almost certainly be one of the questions in the written examination.

CATEGORY 'A'.

1. Certification, in Air Registration Board Form 268, as to the fitness for flight of an aircraft, for which a Certificate of Airworthiness is about to be issued.

2. Certification, in the manner prescribed in the Air Navigation Regulations, as to the safety for flight of a public transport aircraft.

3. Certification of work done under approved Maintenance Schedules.

4. Certification of repairs approved as minor repairs.

5. Certification of modifications approved as minor modifications.

6. Certification of the replacement of approved components and parts.

CATEGORY 'B'.

1. Certification of the overhaul of aircraft, including engine installations, except that the overhaul, repair or modification of instruments, variable pitch airscrews, electrical equipment or automatic pilots shall have been previously certified by a firm approved for that purpose or by an aircraft engineer, 'M' licensed in Category 'X'.

2. Certification of approved repairs.

3. Certification of approved modifications.

4. Certification of the replacement of approved components and parts.

5. Certification of the construction of components and parts, and of materials used therein, unless it is stated in the licence that this duty is excluded.

CATEGORY 'C'.

1. Certification, in an Air Registration Board Form 268 as to the fitness for flight of engines in an aircraft, for which a Certificate of Airworthiness is about to be issued.

2. Certification, in the manner prescribed in the Navigation Regulations, as to the safety for flight of engines in public transport aircraft.

3. Certification of work done under approved maintenance schedules.

4. Certification of the rectification of defects, the embodiment of approved modifications, the replacement of approved parts, provided that this work has not involved dismantling of the engine other than to obtain access to the pistons, cylinders and valve operating gear.

CATEGORY 'D'.

1. Certification of the overhaul of engines, except that the overhaul, repair or modifications of magnetos and other ignition equipment shall have been previously certified by a firm approved for that purpose or by an aircraft engineer "M" licenced in the appropriate category 'X'.

2. Certification of approved repairs.

3. Certification of approved modifications,

4. Certification of the replacement of approved components and parts.

5. Certification of the construction of parts and of the materials used therefore, unless it is stated in the Licence that this duty is excluded.

CATEGORY 'X'.

Sub-division 1 Certification of the installation and compensation of compasses.

Sub-division 2. Certification of overhaul, repair, or modification of magnetos and other ignition equipment and of replacements thereto.

Sub-division 3. Certification of the overhaul, repair, modification or replacements to and installation of:-

(a) Variable pitch propellers.

(b) Engine and aircraft instruments, including or excluding electrically operated instruments.

(c) Electrical Equipment.

(d) Automatic Pilots. (A.N.(G).R. Section VIII).

FLIGHT ENGINEER'S LICENCES.

Where a Flight Engineer has to be carried in an aircraft (Certificate of Airworthiness minimum crew clause) he must hold a Flight Engineer's Licence issued by the Ministry of Civil Aviation, valid for the type of aircraft concerned. Applicants will be required to be aged 21 or over, pass medical and technical examinations, and have had, within the previous twelve months, a minimum of 50 hours flying experience in the type, or similar type for which the Licence is required.

A qualified Service Flight Engineer may be exempt from all or any of these requirements.

FLIGHT ENGINEER CADET CLASS.

Licences may be granted, in the above class, to persons of twenty years of age or over who can produce evidence that they require such authority to enable them to obtain training under the supervision of a Flight Engineer. Proofs of competency will not be required.

(A.N. (G). R. Section XIII. Para: 179).

CHAPTER II

An aircraft may not fly unless the following conditions are complied with:

iv. REGISTRATION.

The aircraft shall be registered and bear the prescribed nationality and registration marks, in the manner required by the law of the country in which it is registered. In the case of aircraft registered in the United Kingdom, the requirements are:-

Nationality mark "G" and registration mark consisting of a group of four letters in Roman Capitals, without ornamentation, with a hyphen between the nationality and registration marks. The width of each letter (except the letter I) and the length of the hyphen shall be 2/3 the height of a letter. The thickness of the lines, which shall be solid and of a colour contrasting throughout with the background, shall be 1/6 of that height. The spaces shall be half the width of a letter. The marks shall be painted once on the right half of the upper wing surface and once on the left half of the lower wing surface, unless they extend across the whole of both surfaces, and shall, as far as possible, be located equidistant from leading and trailing edges with the tops of the letters towards the leading edge. The letters constituting each group of marks shall be of an equal height of at least 20 inches. Also, the marks shall appear on each side of the fuselage between wings and tail surfaces, or, on the outboard sides of the upper halves of the vertical tail surface (s). They shall not interfere with the visible outlines of the fuselage and the marks on the vertical tail surfaces shall leave a margin of at least 2 inches along each side. The height shall be uniform and at least 12 inches. In addition, a fireproof metal plate inscribed with the nationality and registration marks and the full name and address of the registered owner, shall be fixed in a prominent position to the fuselage near the main entrance.

The marks shall be displayed to the best advantage and be kept clean and visible.

Aircraft already registered on 1st April 1949 and which conform to the old regulation need not be altered until 1st January 1951. The only alteration likely to be required is the position of the owner's name plate.

Application for British Registration is made to the Secretary, Ministry of Civil Aviation, who will issue the Certificate of Registration and assign the registration mark. An aircraft will not be registered as British unless wholly owned by British subjects, by British protected persons, or by a Company or Corporation whereof the Chairman, and at least two thirds of the Directors are British subjects or British rotected Persons (A.N.O. Articles 3 and 4).

Change of ownership or permanent withdrawal of an aircraft form service must be notified to the Ministry of Civil Aviation. If the ownership involves a change of nationality the original registration marks will become invalid, otherwise it is usual for the original marks to be retained.

V. CERTIFICATION OF AIRWORTHINESS.

1. The aircraft shall be certified as Airworthy. Under the law of the country of registration.

The British Certificate of Airworthiness, or C. of A. for short, guarantees that the aircraft, to which it relates, has been designed and built to British requirements of strength and performance, giving a high standard of safety. The Certificate of Airworthiness lays down the limits of loading, speed and engine operation, and any special requirements which must be observed. The number and duties of the crew, and the maximum number of persons (including crew) to be carried, the number of passenger seats being also specified. A Flight Manual may also be issued, with the certificate, giving further particulars.

C. of A. Procedure is dealt with in the Airworthiness Requirements - leaflets A1 to A2-3 There are four categories : Normal, Semi-aerobatic and Aerobatic - and special - and nine sub-divisions:-

(a) Public Transport for Passenger.

(b) Public Transport for Mails.

(c) Public Transport for goods.

(d) Private.

(e) Aerial Work.

(f) Racing or Record.

(g) Research or Experimental.

(h) Demonstration.

(i) Crew familiarisation.

A Certificate of Airworthiness may be granted in the Normal, Semi-Aerobatic and Aerobatic categories in any or all sub-divisions (a) to (e) and (h) and (i). In the Special category only (f) to (i) are applicable.

Aircraft in the Normal category are prohibited from performing any evolution which might lead to abrupt variations in attitude.

The Certificate of Airworthiness is issued by the Minister of Civil Aviation on the recommendation of the Air Registration Board. In the case of an aircraft the design of which has not been approved by the Air Registration Board application will have to be made for a Certificate of Airworthiness for a prototype aircraft. This will involve an investigation of the design, but this should not concern the inspector, except that, before finally accepting any part of the structure, he will verify that all relevant drawings have been approved by the Air Registration Board. The Air Registration Board Surveyor will finally inspect each component.

New aircraft constructed to the same design as an aircraft which has already been granted a Certificate of Airworthiness are known as Series Aircraft. In either case new machines will normally be built by firms possessing an "Approved" Inspection Department, which will cover all the necessary inspection up to the flight testing stage, when an inspection of the aircraft and engine(s) is made by representative(s) of the firm holding appropriate 'A' and 'C' Licences. A certificate of fitness for flight, which is incorporated in the inspection record, A.R.B. Form 268, must be signed by the Licensed Engineer(s) who made the inspection. In the case of a prototype this is an Air Registration Board function.

v. FLIGHT TEST.

(ii) The necessary flight tests will be made by a pilot who is a member of the constructor's staff, and who holds the Air Registration Board's approval for testing the type of aircraft concerned. The pilot will perform the tests called for in leaflet A.5-2 of the "Requirements" and, when satisfied, sign the certificate in the Form 268.

v. WEIGHING.

(iii) The aircraft must be weighed, and the empty weight and maximum permissible weight (as authorised in the Certificate of Airworthiness) painted in a prominent position on the outside of the machine - usually port side of the fuselage near the tail. In addition a copy of the weight schedule must be fixed in a prominent position inside the aircraft (See Airworthiness Requirements 5-1)

The Schedule provides the following details:- The weight empty, with a list of instruments and fixed equipment included in that figure. A list of "REMOVABLE" Equipment, excluding radio, with the total and individual weights of the items. A list as above of removable radio equipment, and finally a summary showing empty weight, weight of fuel, oil, crew, removable radio equipment, removable equipment, maximum commercial load (tanks full) and maximum total weight, and centre of gravity position.

v. INSTRUMENTS TO BE FITTED TO OBTAIN "TYPE" CERTIFICATE OF AIRWORTHINESS AFTER JANUARY 1948.

(iv) To obtain a Certificate of Airworthiness the following instruments must be fitted:- Airspeed indicator, altimeter, compass, revolution indicator, oil pressure indicator and such other gauges as are necessary for the engine installation(s). All the above must be of an "Approved" type. The essential engine instruments will be decided between the designer and the Air Registration Board. A fuel contents gauge is mandatory. A manifold pressure, or boost gauge, would be needed for an engine fitted with V.P. Propeller or supercharger (Requirements D.6 - 1).

v. VALIDATION OF FOREIGN CERTIFICATE OF AIRWORTHINESS.

(v) If an aircraft, which has a Certificate of Airworthiness issued by a Dominion or Foreign Government, is placed on the British Register, application may be made for the validation of its C. of A. instead of applying for a British C. of A. (A.N.O. Art: 10-13. A.N. (G). R. Section 3 and 4).

v. AIR REGISTRATION BOARD FORM 268.

(vi) Air Registration Board Form 268 is an important document and a candidate for the 'B' Licence should be familiar with its use.

Air Registration Board Form 268 contains the following information in respect of the aircraft to which it relates:

Nationality and Registration marks.

Application number - type of aircraft - place of construction - type series - constructors number - classification - maximum number of persons carried (including crew).

Particulars of engines - particulars of propellers.

Particulars of fuel and oil tanks.

Record of instruments.

Record of components.

Record of electrical and radio apparatus.

Record of miscellaneous equipment.

Record of installation inspections (signatures and approved stamp numbers).

Record of weights and centre of gravity position.

Record of weights of removable equipment (including radio) not included in the empty weight.

Record of flight test (performance figures and pilots certificate).

Certificate of final inspection for fitness for flight.

Modifications embodied.

A.N.R. Certification (signed by the firm's Chief Inspector or his Deputy or a 'B' Licensed Engineer).

Details of final erection and rigging, inspection of complete aircraft.

When completed the form is sent to the Air Registration Board local office with three "Quarter plate" photographs showing the aircraft in side elevation as large as possible. The Air Registration Board will then consider the issue of a temporary or short term C. of A. usually valid for three months, which will allow the aircraft to fly, pending the issue of the Certificate of Airworthiness from the Ministry of Civil Aviation. The 268 is kept, for reference, by the Air Registration Board Headquarters, who can therefore detect any subsequent change of a serially numbered item and check that an appropriate entry has been made in the log book.

v. CONCESSIONS.

(vii) Concessions may be granted by an Approved Inspection Department to use parts which do not comply with the drawings, provided that strength and serviceability remain adequate. If there is any doubt, the matter should be referred to the stress or design office. All concessions must be properly recorded, and a special form is used by most firms. These forms are serially numbered, for reference, and show the drawing number of the parts affected, the quantity of parts involved and details of the discrepancies often clarified by a sketch. Space is provided for the remarks and signatures of representatives of the Design and Inspection Departments.

vi. FLYING OF AIRCRAFT NOT POSSESSING CERTIFICATE OF AIRWORTHINESS AND/OR CERTIFICATE OF REGISTRATION.

From the foregoing it will be seen that no civil aircraft may fly without possessing a Certificate of Registration and a current Certificate of Airworthiness, but obviously there must be some exceptions to this rule because an aircraft must be test flown to qualify for the issue of a Certificate of Airworthiness. The circumstances in which flights are premitted, and conditions to be observed, are prescribed in the Air Navigation (General) Regulations, Section 3. paragraph 12. There are three sets of circumstances and conditions which are as follows:-

(a) An application for the issue, renewal or validation of a Certificate of Airworthiness or for the approval of modifications shall have been made, and the aircraft shall already have had a Certificate of Airworthiness or else be a "Subsequent" aircraft. Also the flight must take place wholly within ten nautical miles of the place of departure which shall be a Licensed Aerodrome, a Royal Air Force, or Ministry of Civil Aviation Aerodrome, or an Aircraft Factory Aerodrome. The aircraft may be flown to and within the vicinity of the radio testing station suitable for carrying out any radio test required, nearest to the place of departure. (A.N. (G)(A). R. 1950). The flight shall not have been forbidden by the Ministry of Civil Aviation.

Or (b) The flight shall be carried out under the control of a person or firm specially approved for the purpose and be subject to any conditions attached to such approval; the aircraft shall be marked with its registration letters (See Page 10) or if unregistered in a manner approved for the purpose.

(Aircraft Manufacturers have an Identification symbol allotted to them this being painted on the aircraft to comply with the above).

In either conditions A or B, the flight shall be for the sole purpose of qualifying for the issue or renewal of a C. of A, or for experiment or test, and no part of the flight shall take place over a populous area or concourse of people.

Or (c) The flight is carried out under and in accordance with special permission in writing from the Ministry of Civil Aviation.

In every case all other provisions of the Air Navigation Order must be complied with.

vii. DOCUMENTS.

No aircraft shall fly unless it carries the documents required to be carried by the law of the country in which it is registered.

In the case of British Aircraft, when engaged in international navigation or between the United Kingdom and Channel Islands, these are as follows:-

Certificate of Registration.

Certificate of Airworthiness.

Copy of Certificate of Safety, last issued (if public transport).

Operating Crew's Licences.

Journey Log-Book.

Licence to install and operate Radio Appratus if so equipped. If Radio is used, telecommunication log-book.

List of Passengers names.

Bills of lading and manifest for freight (this applies to all aircraft going abroad).

Copy of load sheet (if public transport, See Section XIV).

When not engaged in international navigation but flying as public transport or Aerial work machine:-

Journey log-book (if on a scheduled journey).

Certificate of Airworthiness.

Radio Licence, and if radio is operated, the telecommunication log.

Copy of Certificate of Safety. Last issued (public transport only).

Load Sheet (See Section XIV). (Public transport only).

Operating Crew's Licences.

When the journey log-book has to be carried, the Certificate of Airworthiness and Certificate of Safety should be kept in the pocket of same. (A.N.O. Arts: 25 and 26).

viii. NATIONALITY.

No aircraft shall fly within the United Kingdom unless it is registered in a contracting state or some part of H.M. Dominions.

This refers to the International Civil Aviation Convention of 1944, under which most countries give one another reciprocal rights to fly over their territory. Exceptions to this article are aircraft of a state which has a separate agreement with H.M. Government and Aircraft which are unregistered, and hence possess no nationality but are flying under the regulations laid down in Section III of A.N. (G) R. dealt with previously.

(A.N.O. Art: 1).

ix. CERTIFICATES OF SAFETY.

No public transport or club (if payment is made) aircraft registered in the United Kingdom shall attempt to fly unless it has been inspected, and found to have been maintained in accordance with maintenance schedules which have been approved by the Air Registration Board and a Certificate of Safety has been issued and is in force. A Certificate of Safety shall be issued at such periods as are laid down in the approved maintenance schedules.

The Certificate will remain in force until a new certificate is required by the terms of the maintenance schedules or until the aircraft sustains a serious defect - such as would not be rectified by its operating crew - which-ever is the shorter.

The Certificate must be in duplicate, the original being retained by the owner of the aircraft for six months. The duplicate is carried in the aircraft until the next Certificate is issued, after which it is retained by the owner for six months.

The owner or hirer of the aircraft must provide the necessary information to satisfy the engineers responsible for the issue of the Certificate that the maintenance and inspection required under the schedules has been carried out. The production of a copy of the approved maintenance schedule, the aircraft and engine log-books, and the copy of the last Certificate of Safety, should give the necessary information.

The Certificate, which must be signed by the holder of an Aircraft Engineer's "M" Licence, issued by the Minister of Civil Aviation, in Category 'A' for the first part and category 'C' for the second part will be in the following form:-

Certificate of Safety.

Aircraft Type ....

Nationality and Registration ... .

I here-by certify that I am satisfied that the above aircraft (including its prescribed instruments and equipment, but excluding the engine and engine installations and all instruments relating thereto) is safe in every way for flight, provided that the conditions of loading specified in the Certificate of Airworthiness are complied with, and I hereby certify that all maintenance and Inspection in accordance with the approved maintenance schedules have been carried out and that adjustments and rectifications found necessary have been made and inspected to my satisfaction.

Signed ....

Aircraft Engineer's Licence No. ....

Time of Issue ....

Dated at........This........day of......195..

I hereby certify that I am satisfied that the engines and engine installations (including the prescribed instruments relating thereto) of the above aircraft are safe in every way for flight, and I hereby certify that all maintenance and inspection in accordance with the approval maintenance schedules have been carried out and that adjustments and rectifications found necessary have been made and inspected to my satisfaction.

Signed ....

Aircraft Engineer's Licence No. ....

Time of Issue ....

Dated at.........This........day of...195..

NOTE:

This certificate includes the attachment of the radio apparatus to the aircraft structure and the condition of the earth system of the aircraft, including the bonding and screening to ensure suppression of high frequency electrical interference. It does not include the radio apparatus. (A.N.O. Art: 15 A.N. (G) R. Section VI).

The division of duties between aircraft engineers licensed in categories 'A' and 'C' is given in A.R.B. Notice No. 3.

The following are the items which must be certified by a 'C' Licence holder, and all other parts are the responsibility of an 'A' Licence.

engineer:-

All parts of the Power Plant, including engines, engine bearers, vacuum pumps, fuel pumps, engine driven generators, engine starting systems, ignition, induction and exhaust systems.

All controls connected with the engines or their ancillary systems.

All engine instruments including:-

Revolution indicators, pressure gauges, contents gauges, boost gauges, temperature indicators, flow meters and airscrews.

All parts of installations required for operating any of the above including:-

All fuel and oil system parts, including tanks, all cooling systems parts including engine cowling, all wiring, piping and bonding connected with any of the above.

Aircraft and engines may be certified by the same engineer if he holds an "M" Licence in both categories 'A' and 'C'.

Magnetic compasses may be adjusted by holders of an airline transport or senior commercial pilot's, or aircraft Navigator's Licence, who shall certify to that affect on the deviation cards (A.N. (G). R. Section VI. Art. 30).

In the case of British Registered Aircraft, flying from outside the United Kingdom the Certificate of Safety may be signed by the holder of an appropriate aircraft Maintenance Engineer's Licence granted by the competent authority in Australia, Union of South Africa, New Zealand, Southern and Northern Rhodesia, India, Nyasaland, Pakistan, Canada, Trinidad or Irish Republic. (A.R.B. Notice No.17).

x. MAINTENANCE SCHEDULE.

The procedure for the approval of maintenance schedules is prescribed in the Airworthiness Requirements Leaflet A6-4. The operator of the aircraft must submit his proposals to the Air Registration Board. They may be based on the maker's recommended schedules, given in the service manual for the type of aircraft concerned, but it is pointed out that the maker's schedules are solely recommendations and should be adapted to suit varying operating conditions. The adoption of these or any other schedules must be approved in writing by the Air Registration Board. (A.N. (G). R. Section VI).

xi. INSTRUMENTS AND EQUIPMENT.

The person in charge of the aircraft, shall satisfy himself, before commencing any flight that:-

(a) The aircraft is equipped with the prescribed instruments and equipment and that the aircraft and its instruments and equipment are fit in every way for the proposed flight.

(b) Provision as may be necessary in the circumstances of the proposed flight has been made for any prescribed devices to be used..............

The "Person in Charge" is normally the pilot. The "Prescribed Instruments" are listed hereafter. Fitness for flight will normally be covered by the Certificate of Safety. "Prescribed Devices" refer to de-icing equipment radio etc. (A.N.O. Art: 16).

The items in the left hand column are compulsory for all aircraft, when operating as shown. In addition, if flying for 'hire or reward' the items in the right hand column are also required.

ALL AIRCRAFT.	EQUIPMENT REQUIRED - IN ADDITION TO THAT SHOWN IN THE LEFT HAND COLUMN WHEN FLYING FOR 'HIRE OR REWARD'.
FOR ALL FLIGHTS.	
Instruments and equipment required for the issue of a Certificate of Airworthiness. Radio or Very pistol and cartridges.	Safety harness for every pilots' seat in use (in the case of aircraft conforming to prototype certified as airworthy prior to 1.4.1949. Safety belts will be accepted).
Maps or Charts of any suitable type.	Means of indicating to the passengers when

First aid kit of any suitable type, except in the case of private aircraft.

Spare electrical fuses for all circuits the fuses of which can be replaced in flight, 10% of the number of each rating or three fuses of each rating, whichever is the greater.

safety belts should be fastened.

Turn and bank indicators.

Or Directional Gyro and artificial horizon.

Sensitive altimeter adjustable for changes in barometric pressure.

Time piece with centre seconds' hand.

Such other instrument or equipment as may be specified. Also, if on a scheduled journey, two-way radio.

FOR ALL FLIGHTS BY NIGHT.

Navigation Lights.
Signalling Lamp (Green)

Adequate electrical illumination from the main source of supply, for instruments, equipment and maps.

Turn and bank indicator, or Artifical horizon and directional Gyro.

Torch (of any suitable type) for each member of the crew.

Cabin lights in passenger compartments.

Landing lights consisting of two single filament lamps or one lamp, with separetely energised dual filaments.

FOR FLIGHTS INVOLVING AEROBATIC MANOEUVRES.

Safety Harness for every seat in use.	

FOR FLIGHTS MADE UNDER INSTRUMENT FLIGHT RULES (IFR) IN FLIGHT INFORMATION REGIONS ABOVE THE HEIGHT NOTIFIED BY AIR TRAFFIC CONTROL.

Turn and bank indicator Or Artificial horizon and directional gyro. From 1-10-50 two sensitive altimeters adjustable for barometric pressure.	

FOR FLIGHTS BELOW THE HEIGHT NOTIFIED.

Turn and bank indicator. Or Artificial horizon and directional gyro. From 1-10-50 one sensitive altimeter adjustable for barometric pressure.	

FOR FLIGHTS UNDER INSTRUMENT FLIGHT RULES OR BY NIGHT.

	Over 2,500 lbs. max. permissible weight. Turn and bank indicator.

FOR FLIGHTS UNDER INSTRUMENT FLIGHT RULES OR BY NIGHT (continued)

Artificial horizon.

Directional Gyro.

2 sensitive altimeters adjustable for changes in barometric pressure.

Timepiece with centre seconds hand.

Means of indicating that the power supply of the gyro instruments is satisfactory.

Rate of climb indicator.

Approach chart for each aerodrome specified in the flight plan.

In addition - if over 12500 lbs. 2 airspeed indicators.

Outside air temperatu indicator.

After 1-10-50, unless on a training flight, 2 way radio.

FOR FLIGHTS UNDER I.F.R. IN CONTROL ZONES AND AREAS.

Turn and Bank indicator.

Artificial Horizon.

Directional Gyro.

Two sensitive altimeters adjustable for changes of barometric pressure.

Timepiece with centre seconds' hand.

Means of indicating that the power supply for the gyro instruments is satisfactory.

Rate of climb indicator.

Approach chart for each aerodrome designated in the flight plan.

Two way radio. Radio navigational apparatus.

In aircraft over 12500 lbs. max. permissable weight 2 airspeed indicators.

FOR FLIGHTS OVER WATER BEYOND GLIDING DISTANCE OF LAND.

	Lifebelt or equivalent, equipped with light and whistle for each person on board stowed so as to be easily accessible from the seat. Notices in each passenger compartment stating where the lifebelts are stowed and instruction for their use. Very pistol. Signalling lamp. Radio.

FOR FLIGHTS INVOLVING MANOEUVRES ON THE WATER.

Fog Horn. Bell or Gong. Equipment for Displaying lights. (See Notes).	As above plus additional floatation equipment, of not less than 20% of the capacity of the lifebelts, accessible from outside the aircraft. Marine type pyrotechnical distress signals.

Anchor and equipment for mooring. In addition if the aircraft maximum permissible weight exceeds 5,000 lbs. Sea Anchor (of any type).

Apparatus to facilitate manoeuvring under the aircraft's own power on the water (e.g. reversing propellers, water rudder(s).

FOR FLIGHTS OVER WATER MORE THAN 30 MINUTES FLYING (MAXIMUM ECONOMICAL) DISTANCE FROM LAND, IF THE AIRCRAFT CANNOT CLIMB AT 5,000 FT. WITH ONE ENGINE IN-OPERATIVE.

Approved type of dinghies sufficient to carry all occupants of the aircraft. In each dinghy:-

(1) Means of maintaining buoyancy.

(2) Droque.

(3) Lifeline and means of attaching one dinghy to another.

(4) Paddles or other means of propulsion.

(5) Equipment to protect occupants from the weather. In a pack in each dinghy,

(6) A waterproof torch.

(7) Marine type pyrotechnical distress signals.

(8) Means of making sea-water drinkable.

(9) Sufficient food and water for a period as notified.

(10) First aid equipment.
Items 1 to 5 and 7 must be of an approved type.

For every 4 dinghies, and approved dinghy radio transmitter - method of stowage and operation to be approved.

Routine maintenance and inspection of dinghies and their equipment is to be carried out.

FOR FLIGHTS OVER WATER MORE THAN 90 MINUTES FLYING DISTANCE FROM LAND.

The above dinghy equipment and the aeroplane must have a positive rate of climb at 5,000 ft. with one engine stopped.

FOR FLIGHTS ON WHICH AN ALTITUDE OF 10,000 FT. IS LIKELY TO BE REACHED.

Oxygen supply for crew.

Separate oxygen supply for passengers (but under control of the crew).

Means of indicating to passengers, time and method of use.

Or if the cockpit and cabin are kept at a pressure exceeding the international standard atmospheric pressure at 10,000 Ft. Oxygen for use of crew in emergency case of pressure failure.

FOR FLIGHTS ON WHICH A LICENSED FLIGHT NAVIGATOR IS REQUIRED TO BE ON BOARD (i.e. FLIGHTS WITHOUT LANDING OF OVER 1500 NAUTICAL MILES OR FOR MORE THAN 1000 NAUTICAL MILES OVER WATER.

Equipment	
Chart Tables Navigational Instruments necessary for the particular flight.	Of any suitable type.
Facilities for astronomical observation.	

FOR FLIGHTS WHEN ICE FORMATION IS LIKELY.

De-icing for wing, tail and control surfaces, propellers, fixed aerials insulators, loop aerials, pilot's windscreen. Safeguards to ensure functioning of vital instruments and equipment.

Unless otherwise stated, the instrument and equipment specified shall be of approved type and stowed or installed in an approved manner.

When carrying passengers for hire or reward the first aid kit shall contain sufficient bandages, antiseptic gauze, adhesive plaster, lint, cottonwool, safety pins, tournequet or

Haemostatic bandage, scissors, forceps, water miscible antiseptic, analgesic narcotic (if morphine, or other dangerous drug, not more than ¼ grain per person and in the form of ampoule syringes) stimulant, remedy for burns. (A.N.O. Art: 30, 31 and Schedule II A.N. (G)(A) R. A.N. (R). R. Section III). AN(A)O 1950).

NOTES.

The type and frequency range of the essential radio apparatus will depend upon the route to be flown as it must be capable of making or receiving the signals specified in regulation 2 of the Air Navigation (Radio) (Amendment) Regulations, 1950.

A safety belt retains the lower portion of the wearer's body. A safety harness retains both upper and lower portions. A lap stray fits across the thighs and prevents the passenger hitting the roof in 'bumps'. (Requirements D.27).

Where the Directional Gyro and Artificial Horizon are vacuum operated by a Venturi System, there is danger from ice accretion in the Venturi.

Venturi tubes should be fitted where they will be heated by the engine or an alternative means of suction provided such as a Pesco Pump.

NAVIGATION LIGHTS.

The lights shall be fixed as far apart as possible so as to give a steady unobstructed light of the colour shown on the diagram. The angular limits of visibility are vertical planes at the angles indicated. The lights shall have an intensity of at least five candles in the horizontal plane. A flashing tail light may be used alternating with a flashing white light of at least 20 candles visible in all directions.

SEAPLANES.

1 If under control and not being towed. Navigation lights plus a white light forward showing an unbroken light of at least seven candles, over the field of the port and starboard lights together.

2 If being towed - Navigation lights.

3 If not under control, 2 red lights of at least five candles, one vertically over the other not less than three feet apart, also, if making way, navigation lights, or if not making way the tail navigation light. In daylight - two vertical black balls.

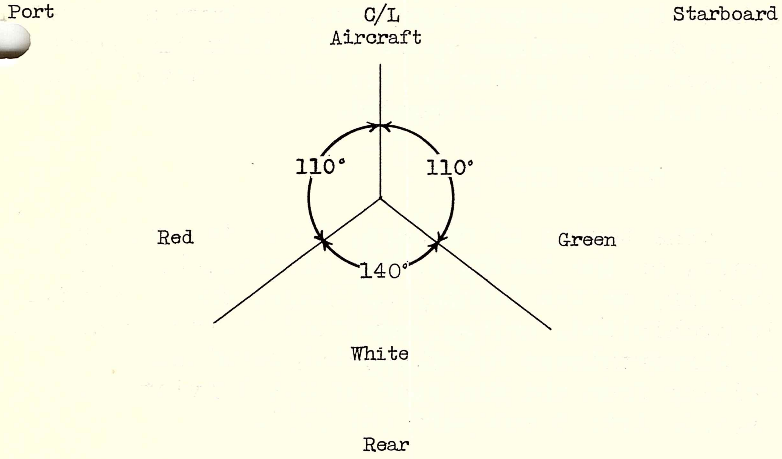
4 If towing another machine - navigation as at (1) above, plus a second white forward light 6 feet vertically from the first, and of an intensity of at least seven candles.

When at anchor:-

Forward, centrally a white light visible all round the horizon having an intensity of at least five candles.

If the machine is 150 feet or longer, a second similar light aft lower than the forward light, also if the span is 150 feet or more, white lights of one candle at the wing tips.

Diagram of Navigation Lights



(A.N.O. Schedule II. Section III 20)
(Schedule XII. Rule 66)

xii NOTICES.

Notices, whether, and to what extent smoking is permitted must be exhibited and in public transport aircraft, notices showing the position and method of use of emergency exits. (A.N.O. Art: 38 to 40).

The number of exits and their design are dealt with in the Airworthiness Requirements leaflet D. (9).

Notices will be required, by the Certificate of Airworthiness to be fitted in the pilot's cockpits showing, as applicable, the maximum permissible weight for landing, engine operational limitations, maximum indicated airspeed, maximum speed with undercarriage down, maximum speed with flaps down, maximum speed with automatic pilot engaged and a notice to the effect that controls must not be left unattended.

xiii TOWING ETC.

The towing of banners, drogue's etc. by aircraft, or the towing of one aircraft by another in the air, or the display of flags, except signal - is prohibited, unless permitted by the Certificate of Airworthiness or by special permission in writing from the Minister of Civil Aviation. (A.N.O. Art: 9 sub para (6) (7)).

xiv. LOADING.

Before the aircraft flies, the person in command shall satisfy himself that:-

The aircraft is satisfactorily loaded....

Loading instructions may be written or diagrammatic or in the form of a mechanical calculator and when complied with will ensure that the centre of gravity does not fall outside the range specified in the Certificate of Airworthiness and that the maximum weight and density of floor loading is not exceeded. (Requirements A6-5).

In the case of a public transport of over 2,500 lb. maximum A.U.W. a "load sheet" must be completed by the person in charge of loading and submitted to the pilot (except for training and short pleasure flights). Also, approval of loading instructions must be obtained from the Ministry of Civil Aviation through the Air Registration Board (A.N. (G).R. Section VI. 37).

Load sheets will be completed in duplicate and disposed of as for Certificates of Safety.

He (the person in charge of the aircraft) shall also satisfy himself before commencing any flight:-

That sufficient fuel, oil and water are carried, and that sufficient output of electricity will be available.

That the wings and control surfaces are free from ice and hoar frost.

That the Pilot's view is unimpaired.

That the performance of the aircraft in the prevailing atmospheric conditions will be adequate. (A.N.O. Art: 16 A.N. (G) R. Art: 33 and 34).

CHAPTER III.

xv. LOG BOOKS.

A journey log book is required to be kept and carried in any aircraft engaged in international navigation, also for every regular airline machine, and must be carried on any scheduled flight. The journey log books are issued by the Ministry of Civil Aviation and shall be kept to show all the particulars for which they provide, that is, details of each flight such as times and places of take off and landing, duration of flights, and names of crew. They are also stamped by customs authorities. Entries must be made in ink and within 24 hours of the flights to which they relate.

Aircraft and engine and variable pitch propeller log-books must be kept for every passenger or goods aircraft flying for hire or reward. In practice it is usual to keep log books for every aircraft as such records make the renewal of the Certificate of Airworthiness easier. These books are obtained from H.M. Stationery Office.

The original entries are made and signed by the constructors, and may consist of the following information, in the case of aircraft log-books.

Type of Aircraft.

Certificate of Airworthiness classification and weights.

Makers serial number.

Makers name and address.

Nationality and registration letters and name of address of registered owner.

Rigging dimensions.

Numbers of modifications embodied, during construction.

Type and serial numbers, and positions of engines and propellers fitted.

In the case of Aero-engine log-books.

Engine type.

Makers number.

Makers name and address.

Owners name and address.

Air Registration Board design approval reference number.

Makers test certificate and test performance figures.

Serial numbers of magnetos and other accessories fitted.

When the engine is installed in an aircraft, the type and registration marks of the aircraft are entered in the engine log book, together with its position in the aircraft, also the serial number of the propeller fitted. This is followed by the performance figure (R.P.M., magneto drops, oil pressure and temperature etc). obtained when the engine is run on the ground.

Subsequent entries will include all work such as overhauls, replacements and repairs done to the engine V.P. propeller or aircraft and must be certified in the following manner by a Licensed Engineer or the authorised representative of an approved firm.

The Certificate of Compliance:-

"I hereby certify that in carrying out the overhaul - repair - modification - replacement specified above, all the conditions and requirements of the Air Navigation Regulations for the time being in force which are applicable thereto have been complied with:

Signed.........................

Authority (Licence Number or Firms approval reference number)..................

Date...........................

Entries of work done as the consequence of forced landing, must be identified as such, and cross referenced to the event in the journey log book. Entries of events which cannot have come to the notice of the engineer may be signed by the pilot.

Flying times, including taxying which are required to be entered in the aircraft and engine and propeller log books, should be entered within 24 hours of the return of aircraft to its station.

Aircraft and engine and propeller log books should never be carried in the aircraft to which they relate. An entry should be made of the time of engine running on the test bed, and a record of ground running kept, but neither should be included in the "running time" which is totalled for schedule periods.

Entries should be made in ink or typescript. Sometimes entries are made on slips to be pasted into the log book, this being the usual practice where the work is done away from the aircraft's base.

Firms which specialise in maintenance work often have printed forms, bearing the necessary certificate, and of the correct size to fit the standard log book, on which they enter the work done on customer's machines. These forms usually state that they constitute a log book entry.

If an entry would be inconveniently long, a separate record may be made and certified when the log book entry, giving a summary of the work done, need only refer to the record, and to the place at which it may be found. Log books must be kept for two years after the last entry. (A.N.O. Art: 24 Section IX. Requirements A4-2)

xvi. RENEWAL OF CERTIFICATE OF AIRWORTHINESS.

A British Certificate of Airworthiness is only valid for the period stated upon it, usually one year from the date of issue. After the expiry of this period, the Certificate of Airworthiness must be renewed before the aircraft flies again. The procedure for a Certificate of Airworthiness renewal is laid down in the Airworthiness Requirements leaflet A2-5.

The Licensed Engineer must prepare an inspection report, detailing all the work, repairs and replacements required to maintain the Airworthiness of the aircraft. Such opening up an dismantling is to be done as will permit a thorough inspection in the internal structure and controls, and such parts as are subject to wear and tear should be checked dimensionally.

The aircraft should be left trestled and in a fit condition for inspection by the Air Registration Board Surveyor, to whom the inspection report, aircraft, engine and propeller log books are submitted.

When the surveyor is satisfied with the inspection report which he may required to be amended as the result of his inspection, he will give permission to proceed with the work detailed in the report, which should include such items as testing of tanks, electrical circuits etc. The inspection of all work carried out and the stages of re-assembly, testing and weighing wil be done by the Licensed Engineer, but the Surveyor may wish to witness tests personally.

Test flights, including radio air tests, will be performed with the surveyor's permission as for Series aircraft, and after completion of all work, the appropriate entry is made in the aircraft log book, and certified by a 'B'

Licensed Engineer.

In addition to the Certificate of Compliance, the following is required:-

I hereby certify that all recommendations by the Air Registration Board in respect of the overhaul of this aircraft for renewal of its Certification of Airworthiness, have been satisfactorily carried out, and all modifications classified by the Board as essential are embodied.

Signed................ (Chief Inspector or
Licensed Engineer).

The Air Registration Board Surveyor may then be informed that the aircraft awaits his final inspection, and when he is satisfied, he will make his recommendation for the renewal of the Certificate of Airworthiness to the Ministry of Civial Aviation.

In the case of the work being done by an Approved Firm, the firm's inspectors will take the place of the Licensed Engineer and in this case the certificates following the entry in the log book regarding details of the work done, will be signed by the firm's Chief Inspector.

The Air Registration Board Surveyor may waive any or all of his personal inspections but copies of all inspection reports must always be sent to him. He is entitled to carry out check inspections at any stage of the work.

The inspection of used aircraft which have not had a Certificate of Airworthiness such as military machines being converted to civil, will be similar to the inspection of Series aricraft for grant of Certificate of Airworthiness and Air Registration Board Form 268 will have to be completed and inspection records should be maintained. Log books will have to be initiated.

If the aircraft is of a type which has not previously been granted a Certificate of Airworthiness approval of the design will have to be obtained. In either case, the Air Registrat Board will probably require certain modifications to be incorporated and it is advisable to seek their co-operation at a very early stage. See also Section XVII.

The continuous overhaul system for renewal of Certificate of Airworthiness is an arrangement whereby the work of the annual overhaul is spread out over twelve months preceding the expiry date of the Certificate of Airworthiness thus avoiding the withdrawal of the aircraft from service for a more or less lengthly period. This system may only be adopted by the special permission of the Air Registration Board and will normally only be considered for application to the largest types of aircraft (over 20,000 lbs. all up weight) and private and club light aircraft.

xvii. REPAIRS.

Repairs will be carried out to approved drawings. Work will be inspected by an appropriately Licensed Engineer or approved firm's inspector, and details entered in the log book and certified as described previously. All structural repairs must be reported to the Air Registration Board and certified by a 'B'

Licensed Engineer (or approved firm). Generally speaking, skin patches and small rib repairs etc., are minor and may be certified by the holder of an 'A' Licence. Drawings of approved repair schemes can be obtained - if not in the aircraft hand book - from the makers. If an unapproved repair is incorporated, approval will have to be obtained as for unapproved modifications - or through the aircraft designers, but temporary repairs are permitted to get an aircraft to a base, provided that the pilot is satisfied that it is adequate for the purpose.

Ex-government spare parts may only be fitted to civil aircraft if -

(a) They have been manufactured by the aircraft constructor or authorised sub-contractor.

(b) They are identified by constructor's serial and/or drawing number.

(c) They are inspected and certified by a suitably Licensed Engineer or approved firm.

(d) Full details of origin and fitting are entered in the log book. Ex-government complete engines must be certified not more than 3 months prior to installation by a 'D' Licensed Engineer or approved firm.

MODIFICATIONS.

Work must be done to approved drawings, and inspected as for repairs. The Modification Number and description, together with the reference number of the Air Registration Board

Form 261 or "Airworthiness Approval Note" will be entered in the log book and certified.

Application for approval of modifications, not previously approved, should be made to the Air Registration Board, who will decide the classification. 'Minor' modifications are approved on Air Registration Board Form 261 and 'Major' modifications on an Airworthiness Approval Note. (A.N.O. Art: 13 A.N. (G).R. Section VII. Requirements Leaflets **A2-5, A4-1**, A4-2).

xviii SPECIFICATIONS.

In order to ensure conformity with the type design aircraft, instruments, equipment and material are required to comply with specifications called for on the approved drawings. All specifications used in civil aircraft must be approved by the Air Registration Board.

The aircraft series, issued by the British Standards Institution, 28 Victoria Street, London. S.W.1. (B.S.S.) and the D.T.D. (Directorate of Technical Development) issued by the Ministry of Supply are automatically approved. The identity numbers of the B.S.S. series consist of a number followed by a letter and a number. The first number is the issue number (on drawings this often is omitted, as in all cases the latest issue is implied).

The D.T.D. series are identified by numbers followed by letters, which indicate subsequent issues (A - issue 2, B - issue 3 etc) these may - if not secret - be purchased from H.M. Stationery Office. An index of current specifications is available for about one shilling. "Approved material" is that which has been proved to comply with the relevant specification, and has been so certified by an approved firm, or an engineer licensed in the appropriate category.

xix APPROVED FIRMS.

The system of the "approved firm" should be understood by all licensed engineers, as on this link depends the chain of proof that the parts used, in the construction or repair of an aircraft comply with the design. An applicant for a 'B' Licence will be expected to have sufficient knowledge to enable him to put a firm on a suitable footing to obtain approval.

The procedure for obtaining the Air Registration Boards approval of a firm's own inspection organisation is outlined in leaflet A7-5 of the Requirements. The approval may be to cover the inspection, testing, and issue of the necessary certificates in respect of the manufacture, or repair and overhaul of aircraft, or engines and parts. Or the inspection, testing, and certification of materials or instruments etc. The approval may cover any one or all the above functions, depending upon the nature of the firms business and the scope of the inspection department both in qualification of personnel and extent of equipment.

The Air Registration Board requirements are as follows:-

The Chief Inspector will be directly responsible to the Directors for the organisation and control of the inspection staff, who must be adequate in numbers and qualifications (thus the Inspection Department will be quite free from any one responsible for production or output). The Chief Inspector must be a responsible and a capable person, and conversant with the Air Registration Board requirements. The appointment of a Chief Inspector is subject to the Board's concurrence, and they may insist that he shall have held a similar position previously or in the case of approval to cover the overhaul of aircraft, or engines, holds an aircraft engineer's "M" Licence in Category 'B' or 'D'.

"The inspection staff shall be provided with adequate facilities and equipment to enable them to carry out their duties effectively."

The type of equipment will depend on the firm's work. In the case of material manufacturers, mechanical test and chemical analysis laboratories would be required, with tensile and hardness testing machines etc., capable of carrying out the requirements of the relevant specifications.

In the case of aircraft, or engine overhaul, the equipment would be quite different, measuring instruments, such as micrometers, plug gauges, thread gauges, D.T.I. etc. should be provided and checked regularly for accuracy. In the case of aircraft, a megger and an ohmeter, and test rigs for petrol flows, hydraulic gear and the carrying out of any pressure tests on the aircraft services would be essential.

For engine work, surface table, 'V' blocks and mandrels, and of course, approved equipment for carrying out the running tests called for in leaflet C.9. of the Requirements will also be necessary.

Two secure and separate "Aero" stores must be provided. A Quarantine Stores where incoming goods are kept until they can be identified with the Approved Certificate covering them. When so identified, goods should be appropriately 'batched' and transferred to the 'Bonded' store.

The usual method of batching is to mark the goods or material with a code number - opposite this number in a book record is entered the details (firm, serial number and date) from the relevant Approved Certificate which is then filed. When material is issued to the shops, for manufacturing purposes, the batch number should be marked on the job card. The job card shows all the manufacturing operations of the detailed part for which it is made out and the inspector, who passes each operation, stamps the card. At the final inspection, the card and the part are both put into the finished part store, which is a section of the Bonded Stores.

Inspection stamps consist of a number, which identifies the individual member of the firms inspection department, and the firms symbol usually the initials of the firm's name, the whole being surrounded by a circular or oval line. The design of the stamp must be approved by the Air Registration Board.

When a firm is approved by the Air Registration Board an 'Authority Number' is issued to it and must appear on all certificates, given under the terms of the approval.

Approved Certificates (formerly known as Release Notes) must be in a form approved by the Air Registration Board. The information which should be shown is as follows:-

Name and address of firm.

Air Registration Board Authority Number.

Serial number of certificate.

Name and address of consignee.

Contract or order number.

Description or part number of goods.

Quantity.

Identification marks (serial number etc).

Specifications of material where applicable.

Serial numbers of test reports and incoming Approved Certificate.

Details of heat treatment and condition of material, when applicable.

Certificate that the parts or material detailed has been inspection, and tested in accordance with the Air Navigation Regulations.

Date.

Approved Certificates are signed by the Chief inspector or by some person who, with the agreement of the Air Registration Board, is authorised to sign for him. They should be made out in duplicate, the original being sent to the consignee and the copy filed by consignor's Inspection Department.

xx RADIO.

When radio is fitted to an aircraft application must be made -

1 To the Air Registration Board for approval of the modification to the aircraft arising from the installation.

2 To the Ministry of Civil Aviation for approval of the aircraft Radio station.

3 To the General Post Office for radio station licence.

The apparatus shall be of a type approved by the Ministry of Civil Aviation and shall be inspected and tested during construction under the supervision of an Inspection Organisation approved by the Air Registration Board.

The General Post Office will give permission, in writing to make test transmissions. The licence will be forwarded when the installation has been approved.

Approval of an aircraft radio station is normally based on the result of a survey by an Air Registration Board Radio Surveyor followed by a functioning test in the air.

When a satisfactory installation report together with a certificate signed by the Radio Operator, and a certificate of compliance by the applicant, is received by the Air Registration Board, the Ministry of Civil Aviation will normally signify approval by endorsing the Certificate of Airworthiness of the aircraft.

The approval and Radio Licence are invalidated by a change of ownership of the aircraft. (Requirements - Section R).

Before commencing any flight the person in command of the aircraft shall staisfy himself that the aircraft is equipped with radio apparatus in accordance with the requirements, see Chapter 2, Section IX, and that such apparatus is fit in every way for flight.

Requests for application forms for Aircraft Radio Maintenance Engineer's licences should be addressed to the Secretary, Ministry of Civil Aviation, London. W.C.2. (A.N. (R). R).

NOTE:- Although this publication was amended up to date at the time of going to press, readers are requested to note that amendments will not be issued in respect of this "Guide to the Regulations". Any subsequent amendments to the Official Orders, Regulations and Requirements will be incorporated in future editions. The Society of Licensed Aircraft Engineers or the Author do not accept responsibility for any errors made by Licensed Aircraft Engineers or others as a result of changes in the Law not incorporated in the copy of this publication to which they have access. It should be used, as its title implies, as a guide to the regulations; and engineers using the information herein should either (a) refer to the appropriate order, Regulation or Requirement to ensure that no changes have been made or (b) keep their copy of "An Engineer's Guide to the Civil Aviation Regulations" constantly amended direct from their own copies of the Orders, Regulations and Requirements.

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